

WE CLAIM:

1. A position sensing apparatus for use in a data storage cabinet having multiple shelves for receiving device enclosures, comprising:

5 a first junction box having an output connection at a first shelf of the cabinet for providing a first shelf identifier signal to a device enclosure connected to the first shelf; and

10 a second junction box linked to the first junction box for receiving an output signal and having an output connection at a second shelf of the cabinet for providing a second shelf identifier signal to a device enclosure connected to the second shelf, wherein the second shelf identifier signal differs from the first shelf identifier signal.

15 2. The apparatus of Claim 1, wherein the first and second junction boxes each include an additional output connection at third and fourth shelves of the cabinet for providing third and fourth shelf identifier signals differing from the first and second shelf identifier  
20 signals, respectively.

25 3. The apparatus of Claim 2, wherein each of the junction boxes includes a sensing wire providing signals to the output connections and being alternately grounded and open to differentiate the first and second shelf identifier signals from the third and fourth shelf identifier signals.

4. The apparatus of Claim 1, wherein the junction boxes include a first and a second set of sensing wires each

providing a number of bit signals that are included in the shelf identifier signals to the output connections.

5        5.    The apparatus of Claim 4, wherein the number of signals is based on the number of wires in each of the sets and wherein the number of wires in the first set differs from the number in the second set.

      6.    The apparatus of Claim 5, wherein the number of wires in the first set is three and the number of wires in the second set is four.

10        7.    The apparatus of Claim 4, wherein the sensing wires of the first and second sets are passed through the first junction box and are included in the output signal to the second junction box and further wherein each of the sensing wires in the first set are moved one position within  
15 the first set and each of the sensing wires in the second set are moved one position within the second set prior to the link with the second junction box.

      8.    The apparatus of Claim 7, wherein the first junction box and the second junction box are substantially  
20 identical and interchangeable.

      9.    The apparatus of Claim 7, further including a cabinet area network bus having terminating resistors at each end.

25        10.   A cabinet for physically storing and communicatively linking computing devices, comprising:  
          a plurality of shelves adapted for receiving device enclosures;

a cabinet bus linked to each of the shelves and adapted to provide a unique shelf identifier signal to each of the shelves; and

means for providing information identifying the cabinet  
5 to each of the shelves.

11. The cabinet of Claim 10, further including a device enclosure on one of the shelves comprising a processor for processing the unique shelf identifier to determine a physical location within the cabinet.

10 12. The cabinet of Claim 11, wherein the processor includes the determined physical location and the cabinet identification information in messages transmitted outside the enclosure.

15 13. The cabinet of Claim 11, wherein the processor determines the physical location by retrieving a shelf identifier from memory using the received shelf identifier signal.

14. The cabinet of Claim 13, wherein the received shelf identifier signal is an 8-bit signal.

20 15. The cabinet of Claim 10, wherein the cabinet bus comprises a plurality of serially connected junction boxes each including a first set of sensing wires and a second set of sensing wires and a side connector linked to one of the shelves for providing the shelf identifier signal from the  
25 first and second sets of sensing wires.

16. The cabinet of Claim 15, wherein each of the sensing wires in the first set are moved one position and

each of the sensing wires in the second set are moved one position prior to the connection to an adjacent junction box to provide an output signal to modify the shelf identifier signal in each consecutive junction box in the cabinet bus.

5           17. The cabinet of Claim 16, wherein each junction box further includes an additional side connector linked to the first and second sets of sensing wires and an additional sensing wire that is linked to the side connectors and is alternately grounded and ungrounded at each side connector  
10 to provide differing ones of the shelf identifier signals within each junction box.

          18. The cabinet of Claim 17, wherein the first set includes 3 of the sensing wires and the second set includes 4 of the sensing wires to provide at least 24 of the unique  
15 shelf identifier signals within the cabinet bus.

          19. A data storage system with passive position determination of enclosures, comprising:  
          a plurality of cabinets each having a plurality of shelves for receiving and linking computing devices, a  
20 cabinet bus linked to the shelves for providing a shelf identifier to each shelf, and a device for providing a cabinet identifier to each shelf;

          a device enclosure positioned on one of the shelves in one of the cabinets and linked to the cabinet bus in the one  
25 cabinet, wherein the device enclosure receives the shelf identifier for the one shelf and the cabinet identifier for the one cabinet and creates and transmits a physical location message; and

a host linked to the one cabinet receiving the physical location message and outputting a physical location of the device enclosure including the one shelf and the one cabinet.

5           20. The system of Claim 19, wherein the cabinet bus includes a plurality of junction boxes comprising a first and second set of sensing wires linked to the shelves and carrying the shelf identifier, the sensing wires of the first set rotating one position within the first set prior  
10 to connection to the next one of the junction boxes and the sensing wires of the second set rotating one position within the second set prior to connection to the next one of the junction boxes, whereby the shelf identifier output to the next one of the junction boxes is modified.

15           21. The system of Claim 20, wherein each of the junction boxes is connected to two shelves and the cabinet bus further includes an additional sensing line that is grounded prior to a first one of the two shelves and is ungrounded prior to a second one of the two shelves.